

Report on Condition and Trend of Meadows and Streambanks In the Golden Trout Wilderness

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Introduction

This report summarizes condition and trend results for meadows and streambanks on four allotments in the Golden Trout Wilderness (GTR), Inyo National Forest (Figure 1). The analysis area is located southwest of the community of Lone Pine, California, and consists of the Inyo National Forest portion of the Kern Plateau, including the headwaters of the South Fork Kern River, Nine Mile Creek watershed, Golden Trout Creek watershed and portions of the Owens River watershed (see Figure 1). The report will focus on the long term condition and trend plots on meadows and streambanks that are being monitored by the USFS Pacific Southwest Regional Range and the Regional Ecology Program. A total of 55 plots were established during 1999 to 2001 and an additional 6 plots were established in 2006. All plots continue to be read at 5-year intervals. Data in this report was collected over an eleven-year period from 1999 to 2010. The objectives of this report are to:

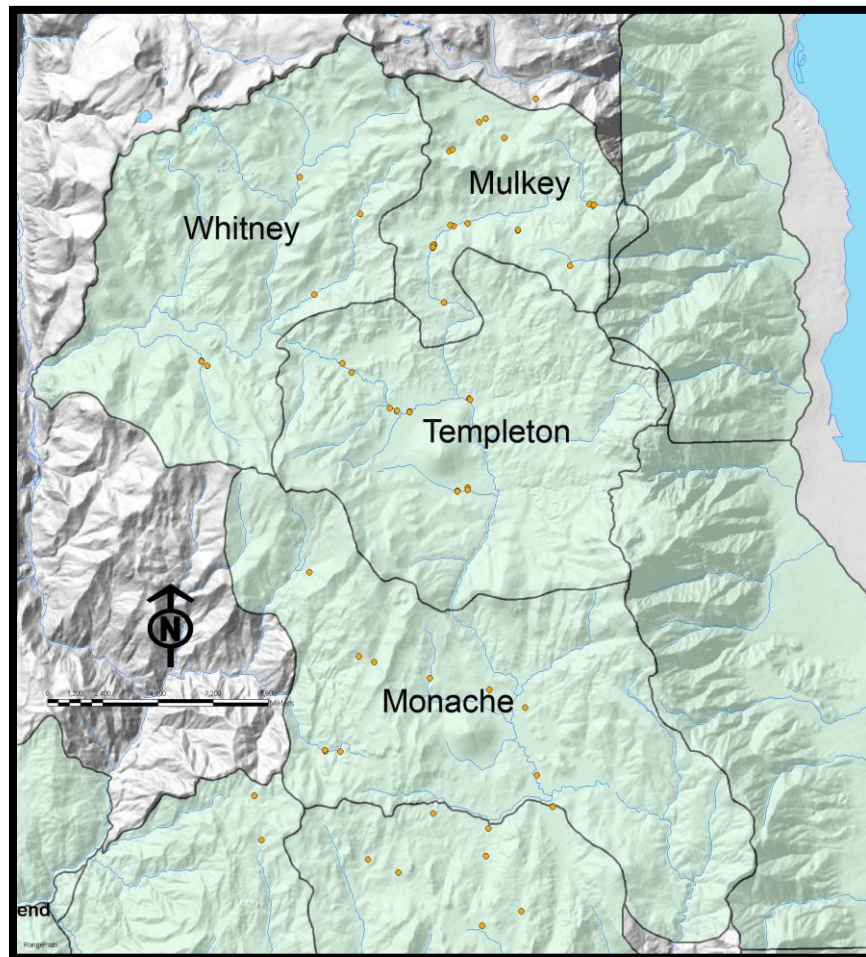
1. Summarize condition and trend results for long-term monitoring plots on meadows and streambanks on the Golden Trout Wilderness
2. Compare condition and trend results with desired conditions established by the Inyo National Forest in: *Desired Condition and Existing Condition for the Kern Ecosystem, September 1998*.

Collection of field data used two different protocols: 1) a protocol to evaluate vegetation and soil condition of meadows and is called the rooted frequency protocol; and 2) a protocol to evaluate the vegetation condition of the streambank areas and is called the greenline method. This report will summarize the results from those two methods in terms of the desired condition as described in Forest planning documents. In addition, information is presented on the functional role of plant species occurring on the plots and soil parameters important in sustaining the biological and physical integrity of these meadows and streambanks.

Basis of Desired Conditions

This section summarizes the desired conditions for meadow and streambanks on the Mulkey, Templeton, Whitney and Monache Allotments on the Kern Plateau. The document written by the Inyo National Forest titled: *Desired and Existing Condition for the Kern Plateau Ecosystem* (September 1998) provides the main source of direction. Additional direction is from the Inyo National Forest Plan Amendment #6: Forest-wide Riparian Utilization Standards (Inyo National Forest 1995a). Desired conditions are broken down into two subcategories: meadow conditions, and streambank conditions.

Figure 1. Map of Kern Plateau and the four range allotments covered in this report. A total of 62 sites were sampled. Individual sampling sites are shown by dots.



Meadow Desired Condition

A meadow is meeting desired conditions if the condition rating is good to excellent as described in Forest Plan Amendment #6 (Figure 2). For the categories of “good” and “excellent”, at least 35 to 40 percent (depending on grazing system) of vegetation on a meadow consists of desirable plant species (later successional plants) for a moist meadow type. This percentage is the number of hits tallied out of 100 total using a toe-point method. This corresponds to the region labeled “Desired Conditions” in Figure 2. Condition ratings for this report were calculated using rooting depth and percent bare soil in addition to the percent of late successional species. It should be noted that vegetation sampling for this report used the rooted frequency method, which is a more objective assessment than the toe-point method. Rooted frequency is similar to the toe-point method in that the number of hits for vegetation species are recorded and the percent hits on desirable species can be calculated.

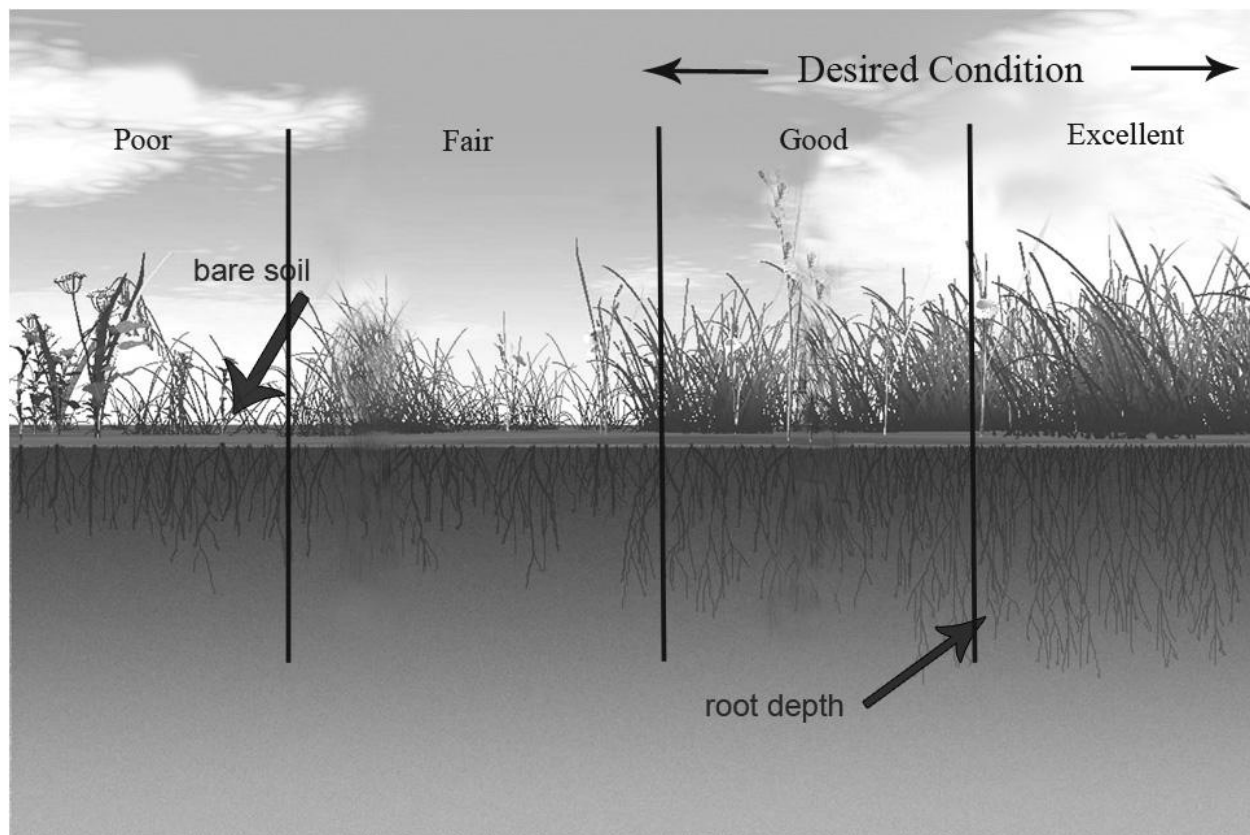
It should be pointed out that a value of 35 to 40 percent for toe-point and rooted frequency protocols does not translate to 35 to 40 percent of cover of a species in a meadow. Actual cover values will be higher than the frequency value for most species. For the purposes of this report, the list of desirable species is taken from the USFS Region 5 list of late successional plant species in wet and moist meadows. Generally, desirable species are those hydric species that are perennial, native, and deep-rooted plants capable of stabilizing soils and providing the physical structure needed for a functioning meadow.

Streambank Desired Condition

A streambank is meeting desired conditions when 80% of the streambank is stable (from *Desired Condition and Existing Condition for the Kern Ecosystem, September 1998*). This is based on sustaining 90% of the natural streambank stability (Streambank Stability Guideline of the Forest Plan), which is estimated to be about 90% (Kershner et al. 2004, Simon 2008). This primarily applies to streams that support fish populations and all monitoring plots are located on perennial streams on the allotment. We measured streambank stability using the greenline method, which estimates the percent of streambank dominated by plant species that are considered stabilizers.

In this rating, desired condition is met when 80% or more of the streambank is dominated by stabilizing plant species. Ratings for plant species were taken from Winward (2000).

Figure 2. Diagram of a sequence of meadow condition classes (poor, fair, good, excellent) and the relationship of desired condition to those condition classes. Also depicted are deeper root depths typical of good and excellent condition. Percent bare soil generally increases in the poor and fair condition classes. Desired condition corresponds to the condition classes termed “good” and “excellent” in the Inyo N.F. Forest Plan Amendment #6.



Allotment Descriptions

Table 1 gives the number of plots in each allotment for each of the two methods; 1) meadow rooted frequency; and 2) greenline streambank protocol. Allotments are labeled as to grazed or ungrazed. In February 2001, a Decision Notice was signed that suspended grazing on the Templeton and Whitney grazing allotments. The period of rest on these allotments was

implemented beginning with the summer of 2001 and this period of rest has resulted in improvements, particularly in the Templeton. Therefore, summaries of condition and trend in this report will discuss the comparison between grazed and ungrazed allotments. A map of the four allotments, together with locations for each plot is shown in Figure 1. In addition, high resolution aerial photos are displayed in Appendices 1 thru 4 and show the placement of plots in the major meadow systems. While many comparisons can be made between allotments due to similarities, there were notable differences in soil and vegetation between meadows in the allotments. Of note, are differing depths to sandy layers in soil profiles among meadows. Meadows in the Templeton allotment had generally deeper depths to sand deposits than meadows in either the Mulkey or Big Whitney allotments (See Figure 3). Figure 3 shows a shallow sand layer at one of the plots in Mulkey meadow and a comparison of a deeper depth to sand at a plot in Templeton meadow. The depth of the sand layer in Mulkey was measured at 22 cm, while the depth to sand at the Templeton locations was 34 cm. While the depth to sand layers was variable, the generally shallower depths at Mulkey, Big Whitney, and Volcano meadows result in plants with reduced height and vigor even when healthy. Comparisons between these allotments and impacts from grazing can still generally be made because late successional plant species are present at all these sites and respond somewhat similarly to grazing pressure.

Table 1. Number of plots for meadow rooted frequency and greenline by allotment.

	Mulkey (grazed)	Monache (grazed)	Templeton (ungrazed)	Big Whitney (ungrazed)
Meadow Rooted Frequency	14	5	10	5
Streambank greenline	14	2	8	4

Figure 3. Comparison of soil profiles at Mulkey Meadow (left) and Templeton Meadow (right). These photos are at the same scale and show the shallower depths to sand layers in Mulkey Meadow as compared to Templeton Meadow. The sand layer at Mulkey on the left shows a lighter color (sandy layer) below the dark loam soil layer.



Summary of Results

Meadow Condition – Grazed Allotments

The number of plots that are meeting desired conditions for meadows vs. not meeting desired conditions by allotment are shown in Figure 4. The graph shows a comparison of grazed allotments and ungrazed allotments. Both grazed allotments show more plots meeting desired conditions than not meeting desired conditions. In the Mulkey allotment, 10 plots were meeting desired conditions while 3 plots were not. In order to improve meadow and streambank conditions, a drift fence constructed in 2008 in Mulkey meadow. This fence has benefited meadow and streambank condition by spreading out the amount and timing of forage use by livestock in the Mulkey system.

Figure 4. Number of meadow plots (rooted frequency method) by allotment that are meeting or not meeting desired conditions.



Three of the five meadow sites sampled in the Monache allotment were meeting desired conditions (see Figure 4). These data indicate that while some sites are not yet meeting desired conditions, overall, species composition, percent of bare ground, and rooting depths are meeting desired conditions for meadows. The downcutting of the South Fork of the Kern River on the Monache allotments has created drier meadows in the central portion of the allotment and this has lowered the resiliency of some meadows. This lowered resiliency appears to have contributed to the lower percent of meadows meeting desired conditions in that area.

Meadow Condition – Ungrazed Allotments

The number of plots that are meeting desired conditions for meadows vs. not meeting desired conditions by allotment are shown in Figure 4. Analysis of plot data collected on ungrazed

allotments are mixed. The Templeton allotment shows a high proportion of plots meeting desired conditions. On this allotment, 7 of 10 plots were meeting desired condition (see Figure 4). These data indicate that meadows in the Templeton allotment have responded well following a rest from grazing and are generally meeting desired conditions. Both Templeton and Ramshaw meadows on this allotment have generally deeper soils and tend to support deep rooted sedges and these plants have responded well. Results for the Big Whitney allotment were variable, with 3 meadow plots meeting desired conditions and 2 meadow plots not meeting desired conditions (Figure 4). The two meadow sites not meeting desired conditions were both affected by grasshopper invasion in 2001. One of the sites was in Big Whitney Meadow and the other in Volcano Meadow. Damage done by grasshoppers on these two meadow sites appeared to offset any improvements in meadow condition that could be attributed to rest from grazing. Grasshoppers killed nearly 100% of the sedges and other graminoids on these two sites. In addition, soils in both the Big Whitney meadow and Volcano meadow on this allotment generally are shallower when compared to meadows on the Templeton allotment and vegetation tends to recover slower.

Greenline (Streambank) Condition- Grazed Allotments

The number of plots that are meeting desired conditions for greenline plots vs. not meeting desired conditions by allotment are shown in Figure 5. The graph shows a comparison of grazed allotments and ungrazed allotments. The number of greenline (streambank) plots in the Mulkey allotment meeting desired conditions for streambank stability was 8, while the number of streambank sites not meeting desired conditions was 6. Sample points for the Monache allotment were low, with only two greenline sites sampled. For the Monache sites, 1 site was meeting desired conditions while one site was not. The fenced corridor along the South Fork of the Kern River on Monache meadow has resulted in excellent streambank stability for that area. The data indicate that greenline condition on the Mulkey allotment is generally meeting desired conditions within current grazing standards, and sites that are not meeting desired conditions

Figure 5. Number of greenline (streambank) plots by allotment that are meeting or not meeting desired conditions.



need continued monitoring. More greenline sites need to be established and monitored in the Monache allotment in order to characterize the overall greenline condition.

Greenline (Streambank) Condition- Ungrazed Allotments

The number of greenline sites meeting or not meeting desired conditions for both grazed and ungrazed allotments is shown in Figure 5. Streambank vegetation and stability, which is monitored by the greenline method, tends to respond relatively quickly to changes in grazing management when compared to meadow condition. Therefore, it is not surprising that greenline condition in the ungrazed allotments (Templeton and Big Whitney) show a greater proportion of sites meeting desired conditions vs. not meeting desired conditions when compared to the grazed allotments and when compared to meadow sites overall. Data indicate that 7 out of 8 sites on the

Templeton allotment were meeting desired conditions for streambank stability. While on the Big Whitney allotment, 3 out of 4 sites were meeting desired conditions for streambank stability. Overall, streambank stability has responded well to the rested condition and most sites on these allotments are meeting desired conditions for streambank stability.

Overall Trend

The overall trend for meadow and greenline plots combined is shown in Figure 6. This graph represents 10-year trend from a total of 46 plots. Figure 6 shows that a higher percentage of plots in the ungrazed allotments are in an upward trend as compared to the grazed allotments. Nine out of 24 plots (38%) in the ungrazed allotments are in an upward trend, as opposed to 6 out of 22 (27%) plots in the grazed allotments. These data indicate that the ungrazed allotments, Templeton and Big Whitney, have responded positively to the rest period from grazing and overall are in an upward trend. In the grazed allotments, Mulkey is mostly stable to upward. The Monache allotment is stable based on the data in Figure 6. Figure 7 shows a photo comparison from 1999 to 2009 or streambank trend in Templeton Meadow. The photo shows typical improvement in streambank stability following rest from grazing.

Figure 6. Number of plots by trend category by allotment. Data are for both meadow and greenline plots taken together.

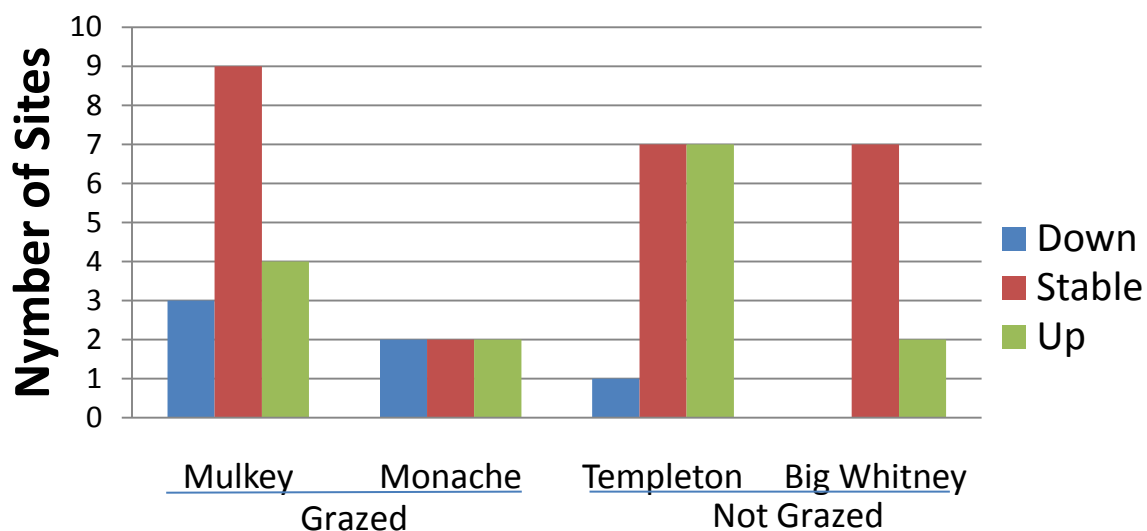
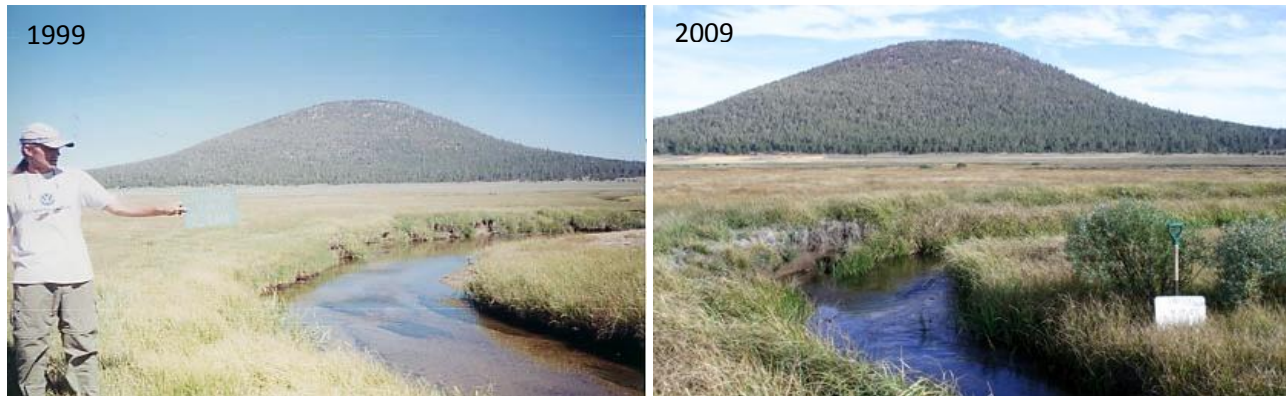


Figure 7. Photopoint comparison for plot INY0004 in Templeton Meadow. The photos show an example of bank healing and some scattered willow growth following rest from grazing.



Summary

The 61 sites sampled in this report represent condition and trend data from permanent monitoring sites established in the Golden Trout Wilderness. These sites were selected to represent areas in the allotments where trend would be most apparent. A key question for management of the Golden Trout Wilderness is whether the ungrazed allotments have shown improved condition based on rest from grazing.

Whether the ungrazed allotments have shown improvements since rest from grazing can be determined from the trend data in Figure 6. A higher percentage of sites are in an upward trend in the ungrazed allotments when compared with the grazed allotments. For the most part, an upward trend has been observed in streambank stability and meadow condition in both the Templeton and Big Whitney allotments. Improvements in meadow health in the Big Whitney allotment has been slower than in the Templeton allotment, due in part to shallower soils and the disturbance effects from grasshoppers. Below are summary statements based on the data presented in this report:

- 64% of sites in the grazed allotments are meeting desired conditions for both streambank and meadow condition, while 74% of sites in the ungrazed allotments are meeting desired conditions.

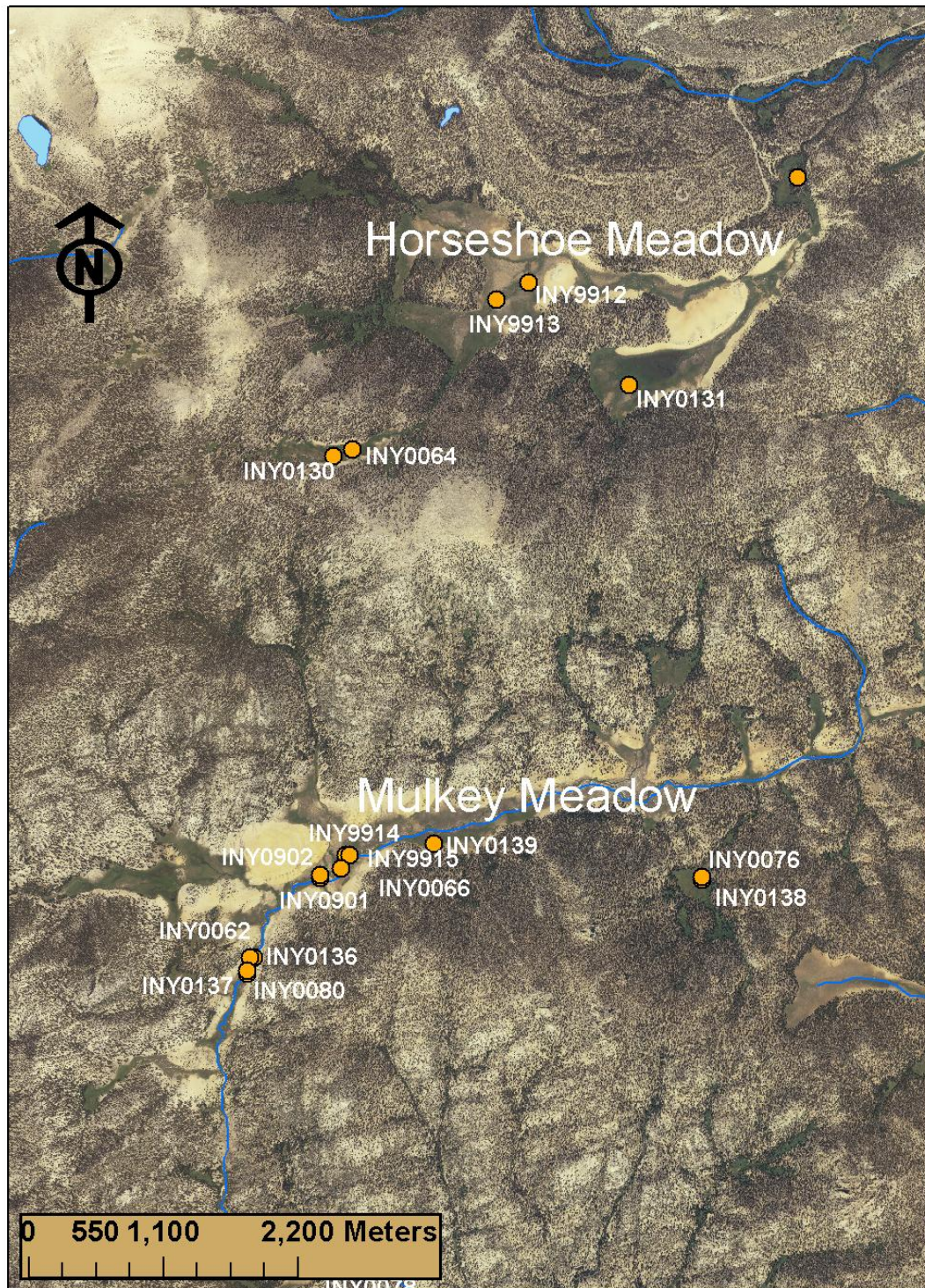
- For both meadow and streambank condition, the Templeton allotment had the highest percentage of plots in an upward trend (47%), followed by Monache (33%), Mulkey (25%), and Big Whitney (22%).
- For the non grazed allotments, rest from livestock grazing has resulted in a significant improvement in meadow condition and streambank stability on the Templeton Allotment. Results of rest on the Big Whitney allotment is mixed; partly because of confounding factors, previous grazing impacts, and site differences.
- For the grazed allotments, Mulkey shows a positive upward trend overall for meadow and streambank condition, due in part to the fencing strategies being employed in Mulkey Creek. Trend for the Monache allotment for meadow and streambank condition is stable for the most part.

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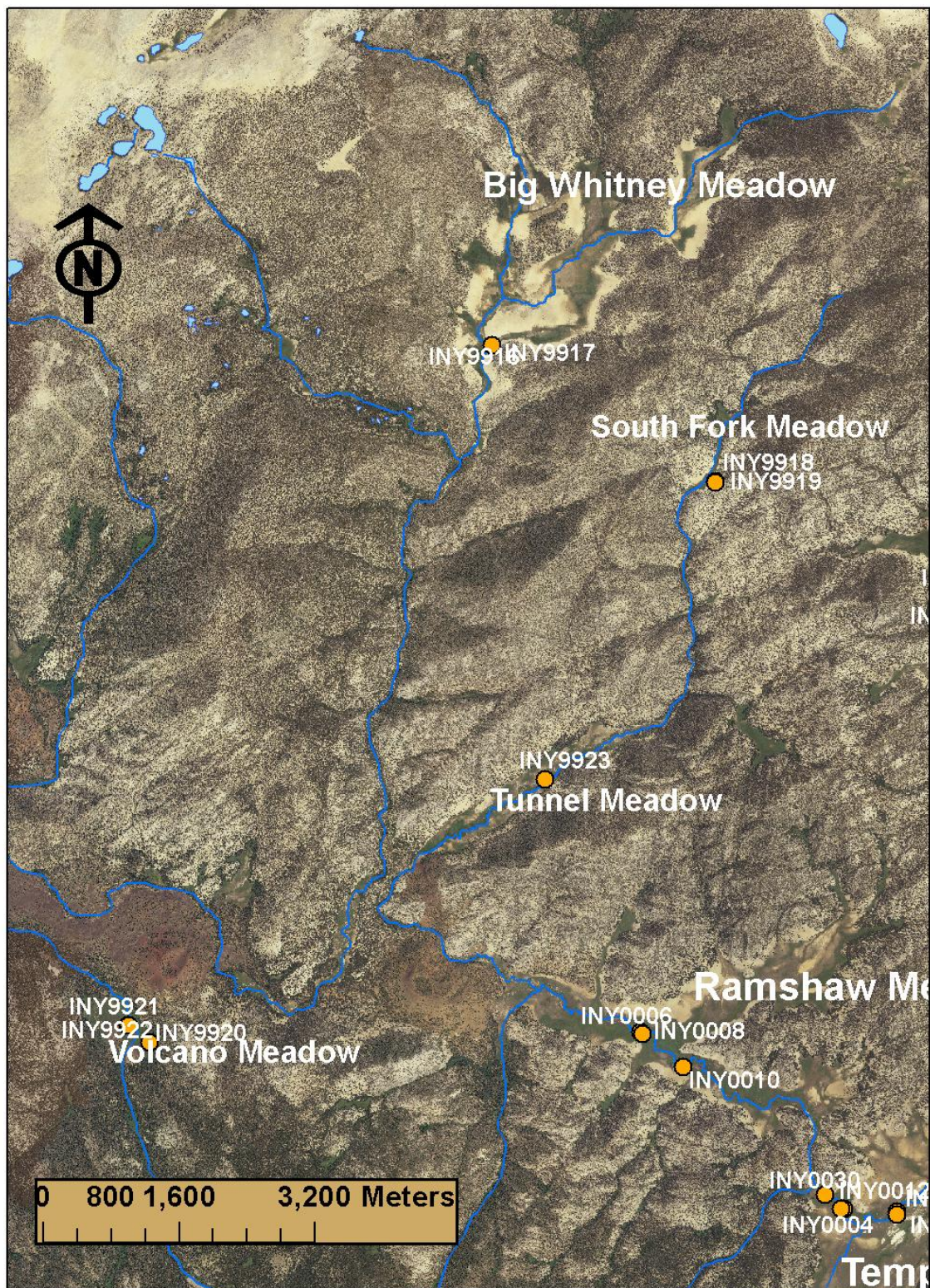
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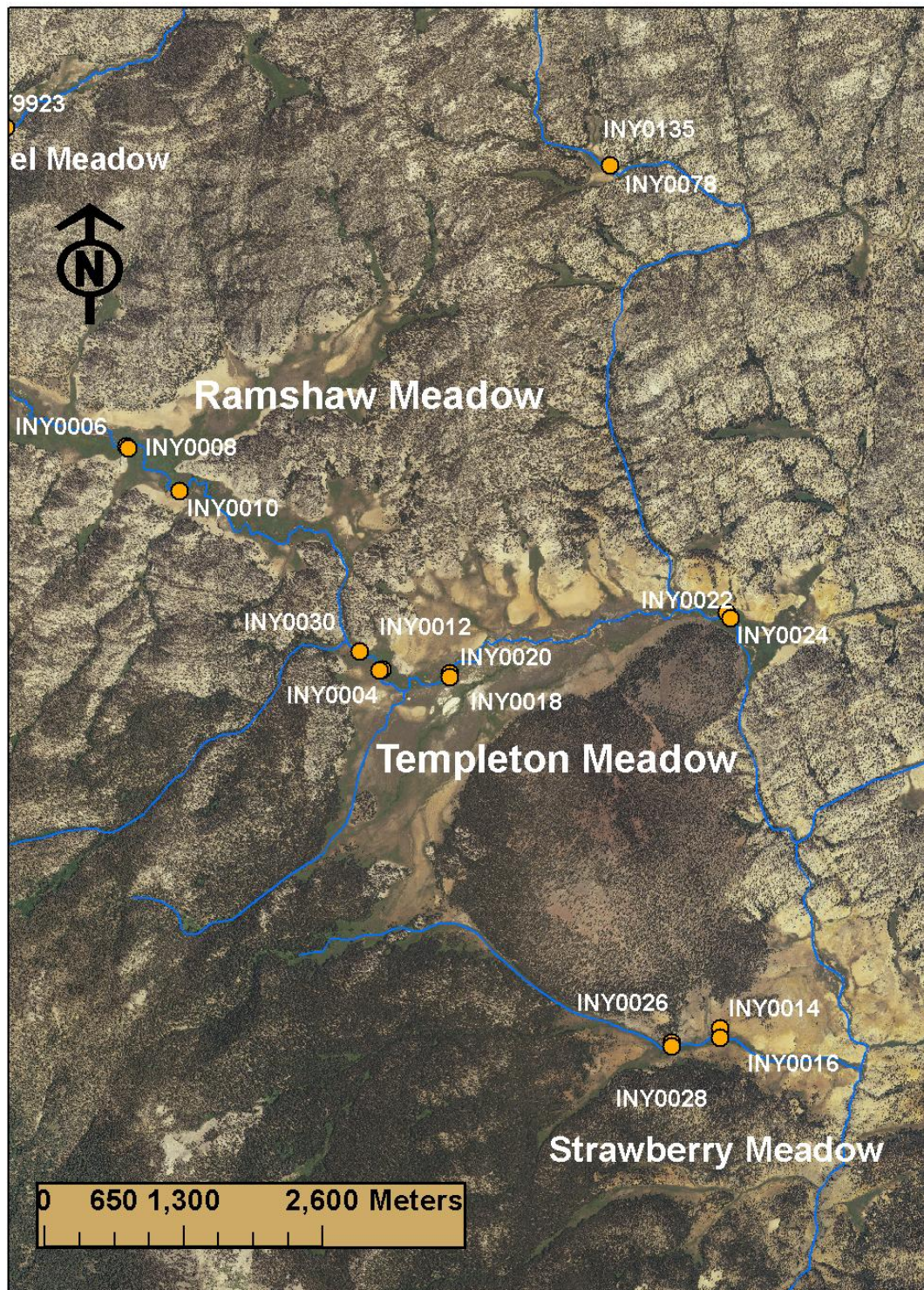
Appendix A. Plot locations on the Mulkey allotment. Meadow systems include Horseshoe, Mulkey Meadow, Round, and Poison.



Appendix B. Plot locations on the Whitney allotment. Meadow systems include Big Whitney, South Fork, Volcano, and Tunnel meadows.



Appendix C. Plot locations on the Templeton allotment. Meadow systems include Templeton, Ramshaw, Strawberry, and Lewis Stringer. Plot codes on the map match the plot codes listed in



Appendix C. Plot locations on the Monache allotment. Meadow systems include Monache, Bakeoven, Caas Vieja, and Beerkeg.

